

**PREVIEW**

# **Connecticut**

**RIVER BASIN STUDY**

**SEPTEMBER 1970**

**CONNECTICUT RIVER BASIN COORDINATING COMMITTEE**

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## **RIVER BASIN STUDY**

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### **INTRODUCTION TO A PLAN FOR DEVELOPMENT**

This summary sets forth the results of a six-year comprehensive study of the 11,250 square mile Connecticut River Basin together with a Plan of Development of the water and related land resources. Foreseeable short and long-term resource needs are identified and a plan for the best uses of the resources to meet the needs is spelled out in the report. The study is the product of Federal, State and regional representatives working cooperatively under the broad supervision of the Connecticut River Basin Coordinating Committee. Guidance was provided by criteria of the Water Resources Council which will forward the report, together with its comments, to the President and the Congress.

Projects and programs recommended for initiation in the next 10 to 15 years are included. Potential measures designed to meet the basin needs through the year 2020 are identified.

This planning effort was brought about because of the necessity to solve the many complex water resources problems that are being produced by an ever-increasing population; by an ever-enlarging mass urbanization pattern of development; and by an ever-increasing and sophisticated technical change. Meeting this challenge effectively requires

In quest of every factor which would contribute to a valid evaluation of problems in and solutions for the Basin, the Committee gave careful consideration to meeting present and future requirements for water supply, flood control, navigation, water quality, hydroelectric power, recreation, fish and wildlife, land use and other allied purposes, all related to water resources. Guidelines for the planning effort provide for consideration of multiple objectives and multiple water resource uses. This criteria applies to regional areas as well as to specific projects such as a reservoir, or a non-structural measure such as a scenic riverway.

The plan presents a framework into which can be fitted in proper relation all other projects and programs as they are developed. It spells out a series of objectives and discusses programs and priorities within the framework and provides guidance for programs sponsored by State, Federal and regional planners. The Plan being conceptual invites coordination and separate efforts, in orderly fashion, leading to a balanced program of water and related land resource allocations.

## THE CONNECTICUT RIVER BASIN

"To waste, to destroy our natural resources, to skin and exhaust the land instead of using it so as to increase its usefulness, will result in undermining, in the days of our children, the very prosperity which we ought by right to hand down to them, amplified and developed."

Theodore Roosevelt, in 1907, sent that message on conservation to Congress. The warning can be applied to the Connecticut River Basin and to similar areas now heavily taxed by human usage and demands.

The Coordinating Committee was struck with the natural wealth generated by the beautiful 400-mile river. Rising beyond the Canadian border, it flows through four states into Long Island Sound. Vermont has the largest basin land mass of the four states, 35 percent. Massachusetts has 24, New Hampshire 28 and Connecticut 13 percent. At its widest span, the basin is 60 miles. Elevations reach from sea level to 6,000 feet. Located within the Appalachian highlands of North America, the Berkshires, Green Mountains and White Mountains are important ranges.

quality, in additional recreation facilities, even in the preservation and restoration of the natural beauty of the Basin if the Basin's opportunity for development is to be met and if the needs of the increasing population are to be satisfied?

**WATER QUALITY** - Existing water quality is seriously degraded in significant portions of the basin precluding the use of water for many desirable and legitimate uses. The most immediate and pressing need is for the construction of adequate waste water treatment facilities at all municipal and industrial waste sources. Problems of nutrient enrichment and pollution from uncontrolled sources such as produced by runoff from urban and rural watersheds are mounting. Requirements for low-flow augmentation after appropriate levels of treatment are likely if established water quality standards are to be upheld.

**POWER** - Development within the Basin will require ever-increasing amounts of electric energy. Although present or planned supplies will just meet demands (5,000 megawatts) through 1980, projections through 2020 indicate that 33% of the then demand (42,000 MW) will have to be met from sources outside the basin.

**RECREATION** - An expanding population enjoying higher standards of living, more affluency, more leisure time, and improved methods of transportation will spend more time on outdoor recreation. Overcrowding of the Basin's public and private recreational facilities is already occurring. Less than 4 percent of the area is currently publicly-owned recreation land. Improvements in the way of stream bank acquisition, access, scenic and recreational rivers and open space corridors are needed if the public is to share in the natural resources.

The demand for fishing and hunting opportunities is rapidly increasing. The needs for fishing opportunities show a major deficiency in the middle and lower basins. There is a strong desire to realize the full potential of the anadromous fishery resources of the basin. This desire is concerned chiefly with restoration of the historical runs of American shad and Atlantic salmon, to provide high quality fishing opportunities and long-term needs for sea food.

**PRESERVATION OF PRICELESS SITES** - There is a need for conserving archeological, historical and natural sites in the Connecticut River

Education is vital if communication and understanding is to be achieved, for this, in the final analysis, will be the basis for decision-making on plan elements.

## A PLAN FOR DEVELOPMENT

In formulating a plan to meet the needs and desires of the people in the Connecticut River Basin, the Coordinating Committee strove to insure that all elements be compatible and that programs and projects be flexible and adaptable to unforeseen demands and changing patterns of needs. Alternatives were given due and responsible consideration.

The Committee developed a plan to accommodate two time frames, namely, an "early action" plan covering the next 10 years; and a "long range" framework type plan embracing requirements and opportunities to the year 2020. A resume of the "early action" plan is presented here.

The 1980 Basin Plan, as recommended by the Coordinating Committee, is estimated to cost \$1,800,000,000 (based upon 1969 price levels). The plan is described briefly in the following paragraphs and in more detail in the report and in specific resource appendices. The proposals are presented in 10 broad element categories that in turn cover some 54 specific parts.

Element No. 1, Water Quality. This element concerns five separate parts, four of which represent the basin States. New and improved waste water treatment facilities, at least to the secondary treatment level, are an essential first step in all parts of the basin. The estimated cost of secondary treatment for known sources of pollution in the basin is \$240,000,000 allocated as follows: Massachusetts \$96,000,000, Connecticut \$70,000,000, New Hampshire \$43,000,000, and Vermont \$31,000,000. Additional expenditures are also required for construction of interceptor sewers, pumping stations and collection systems. Flow augmentation storage is recommended in certain new reservoirs to serve areas where more than secondary treatment is required and where the cost of flow augmentation is less than the cost of equivalent advanced waste treatment. The fifth and final part of Element No. 1 concerns other considerations for further and future detailed studies. These are as follows:

Element No. 2, Power. This element involves five sources of energy, as follows: conventional hydropower; fossil fuel generation; pump storage hydro; nuclear generation; and energy to be imported from outside of the basin areas. By 1980, the supply of power in the Connecticut River Basin will more than double. A major portion of this increase will be due to the installation of pumped-storage peaking plants and expansion of base-load power capability by means of nuclear generation plants. Two new pump storage plants will provide 1,600 megawatts of peak power, while additional nuclear plant construction would add 1,800 megawatts to the system. During this period, there will be a slight increase in conventional hydro capacity but a decline in the role of conventional hydroelectric plants in supplying peaking power. Fossil fuel thermal plants, which now supply base-load generation are expected to decline in both kilowatts of capacity and percent of total supply.

Element No. 3, Outdoor Recreation. This element is presented in eight parts, four of which concern the requirements for water surface area in the four basin States. To meet the growing needs, the Committee recommends firstly the expansion of facilities and improved access at existing water bodies, and secondly, construction of new water bodies. There is need for 15,000 additional acres of water in New Hampshire; 13,000 acres of additional water needed in Vermont; 25,000 acres of additional water needed in Massachusetts; and an additional 22,000 acres of recreation water needed in the State of Connecticut. The fifth part of Element No. 3 concerns the implementation of the Bureau of Outdoor Recreation's National Recreation Area Plan, a coordinated Federal-State-community framework plan for recreation development along the main stem of the Connecticut River. Part number 6 of this element concerns the establishment of wild, scenic, and recreational stream categories. Part number 7 provides for the utilization of existing water supply reservoirs to meet recreation needs. These 7 parts to the recreation element will not only meet the outstanding needs to a great degree, but will provide for many multiple-purposes available in the control of these lands.

Element No. 4, Preservation of Sites. This element is presented in four parts and provides for the preservation of those sites of unique or unusual nature which should not be disturbed if possible by future developments within the basin. Some 850 sites of archeological, historical, or natural resource areas were identified. Historic and natural areas to be preserved in the State of Connecticut consist of 49 sites, in the Commonwealth of Massachusetts a total of 114 sites, in

Water supply needs are presented for each of the basin States in detail. The study finds that the natural abundance of available surface and ground-water supplies, if properly developed, can meet all projected municipal and industrial needs of the basin. Out of basin needs for the 1980 time period can be met by flood-skimming operations such as that proposed in conjunction with the Northfield Mountain pump storage power project. Similar operations can be introduced at the existing Corps of Engineers' Tully Reservoir located in the Millers River watershed. "Flood-skimming" is a procedure for diverting surplus high river flows from a stream which are considered excess to the needs or uses within that stream at the time of occurrence.

Element No. 8, Navigation. This element is presented in four parts; the first part provides for commercial navigation from Long Island Sound to Hartford; navigation improvements from Hartford to Holyoke; recreational navigation improvements at main stem power pools; and main stem and tributary improvements for canoeing. The plan in summary provides for deepening and widening the navigation channel from the mouth of the Connecticut River to Hartford for a distance of about 52 miles. This portion of the river is used now for commercial and small boat activities. In addition, a 32-mile recreational navigation project is included from Hartford to Holyoke. Boat ramps will be constructed at various points along the river and trailer service will be established at four existing power dams to permit by-passing of these dams during the boating season, as well as improved access to these attractive water bodies. Although no reservoir storage has been specifically justified to augment flows for canoeing, some benefits will be obtained through the implementation of other multiple uses at the reservoirs that are included in the plan.

Element No. 9, Upstream Water and Related Land Resource Potential. This element is presented in five parts: Structural Measures - (1) multiple-purpose upstream watershed projects; (2) other upstream impoundments not part of watershed projects; and (3) structural programs in national forests; Non-Structural Measures - (1) land use, treatment, and management programs; and (2) resource planning with local and state units of government. The early-action program includes eight multiple-purpose watershed projects currently being planned under Public Law 566, and nine additional potential watershed projects found to be feasible. In addition to the 78 multiple-purpose floodwater retarding structures contained in these 17 watershed projects, another 118 reservoir sites on small upstream drainage areas have been recommended to meet 1980 water resource needs. The plan further recommends

Part 7 includes incidental, but additional, flood control as provided at three major multiple-purpose reservoirs; namely, Gardner Dam in the Millers River Basin in Massachusetts, and Cold Brook on Roaring Brook and Blackledge Dam in the Salmon River watershed, both in the State of Connecticut.

## CONCLUSIONS

The Committee believes that the basin needs that have been identified and analyzed reflect current population desires as expressed by public participation. Social and behavioral patterns will change over the 50-year projection period. Thus, proposals suggested for meeting 1980 requirements are more apt to reflect the nature of the needs to which the basin plan addresses itself. The Connecticut River Basin has, since its initial settlement, been dependent upon its natural resources. Its people developed these resources - not always in the wisest manner. The Coordinating Committee concludes that a more careful allocation of natural resources will be necessary if the basin is to continue to grow and still maintain a high quality in its environment. There are sufficient water and related land resources in the valley to meet the large and broad scale needs projected for the 1980 and 2020 time frames, provided that enhancement, preservation, restoration, conservation and orderly development of resources in the public and private sectors are assured. There are adequate resources to permit the preservation of areas of unusual quality and to maintain open space to balance new growth areas. The Committee finds opportunities and requirements for Federal, State, local and private action.

## RECOMMENDATIONS

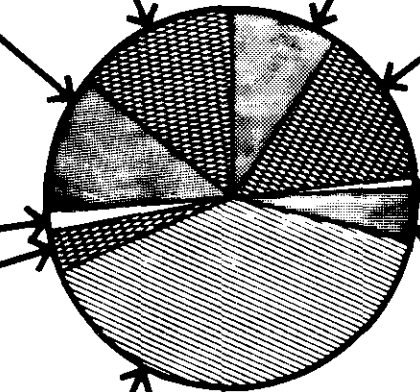
The Connecticut River Basin Coordinating Committee recommends:

(1) The Basin Plan, as presented and discussed in this report, be accepted and used as a guide for the development and beneficial use of the water and related land resources of the Connecticut River Basin;

(2) The projects and programs in the 10 to 15 year category, referenced as the 1980 Plan for Development, be implemented through appropriate agencies;

(3) This report be used as a supporting document for the individual agency reports which would be the basis for authorization of the various

**TOTAL COST \$1.8B**



**WATER QUALITY**

1. Secondary Level Treatment for 1980	\$ 240M
2. Advanced Waste Treatment for 1980	19
3. Others (Costs not available)	
Low Flow Augmentation	
Combined Sewer Separation	
Uncontrolled Runoff	
Diversion of Wastewaters	
Bottom Deposits	
Cost	\$259M

**WATER SUPPLY**

1. Northfield Mt. Diversion	\$ 60M
2. Expansion of Municipal and Industrial Supplies	125
3. Corps' Reservoirs	19
Beaver Brook	
Tully	
Honey Hill	
4. Upstream Reservoirs	3
Cost	\$207M

**ANADROMOUS RESTORATION**

1. Fish Ladders at Five Existing Power Dams	\$ 13M
2. Construction of New Fish Hatchery Facilities	7
3. Streambank Acquisition	5
4. Provision of Reservoir Flow Releases	4
Cost	\$ 29M

**RESIDENT FISH AND WILDLIFE**

1. Improved Access at Existing Water Bodies (approx)	\$ 3M
2. Provision of New Water Bodies	37
Corps' Reservoirs 12	P.L. 566 Reservoirs 2
Other Upstream	23
Reservoirs	
3. Expansion of Hatchery Facilities	5
4. Extensive Streambank Acquisition Program	20
Cost	\$ 65M

**POWER**

Installed Capacity	3,500 megawatts
1. Conventional Hydro	2.4%
2. Pumped Storage Hydro	43.7%
3. Int. Combustion/Gas Turbine	7.1%
4. Nuclear-fueled Steam	46.8%
Cost	\$700M

**FLOOD CONTROL**

1. Corps Dams	\$ 86M
Victory	\$ 2
Bethlehem Junction	5
Gaysville	23
Claremont	10
Honey Hill	\$ 3
Meadow	41
Beaver Brook	1
Knightville	1
2. Seventeen Upstream Watershed Projects	25
3. Other Upstream Dams	11
4. Five Local Protection Projects	51
5. Flood Plain Regulation (*estimate not possible)	
Cost	\$173M

**OUTDOOR RECREATION**

1. Expansion of Existing Water Bodies	\$ 10M
2. Construction of New Water Bodies	93
Corps' Reservoirs \$55	P.L. 566 Reservoirs \$10
Other Upstream	28
Reservoirs	
3. National Recreation Area Plan	120
4. Wild and Scenic Rivers	25
5. Modification of three existing Corps' Reservoirs	5
Cost	\$253M

**NAVIGATION**

1. Long Island Sound to Hartford	
Commercial project	\$ 4M
2. Hartford to Holyoke	
Recreation project	7
3. Improvements in Main Stem Power Pools, etc.	1
Cost	\$ 12M

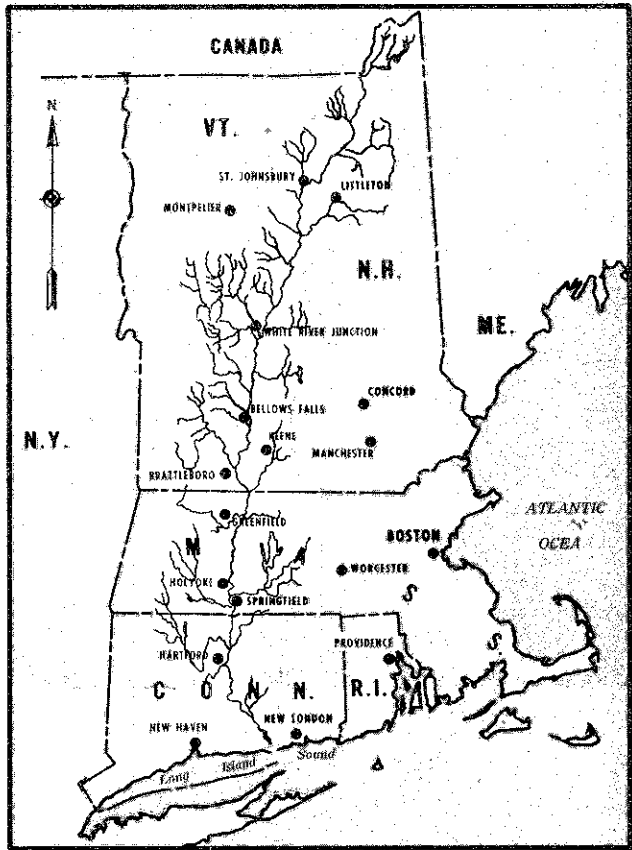
**UPSTREAM WATER AND RELATED LAND RESOURCE**

MANAGEMENT (Including forest acquisition and land treatment)	
1. Structural Improvements and Land Acquisitions for National Forests	\$25M
2. Non-Structural Land Treatment to Agricultural, Urban and Forest Land	35
3. Technical Assistance to Communities and Resource Conservation Development Programs	25
Cost	\$ 85M

**PRESERVATION OF SITES**

1. Archeological	
2. Historical	
3. Natural Resource	
Cost	*
* Estimate not possible	

**1980  
EARLY ACTION PLAN  
CONNECTICUT RIVER BASIN**



LOCATION MAP

LEGEND

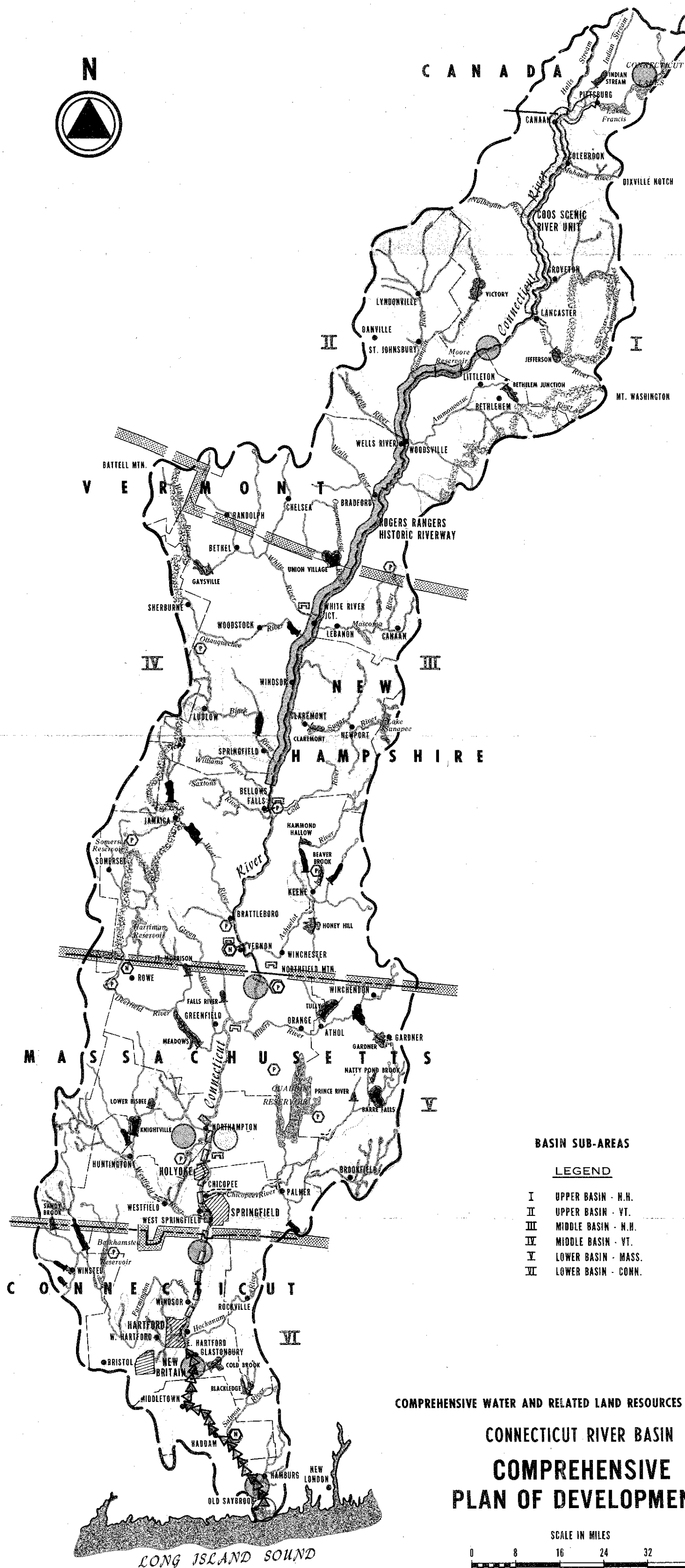
PROJECT OR PROGRAM	EXISTING OR UNDER WAY	EARLY ACTION PLAN	LONG RANGE PLAN
UPSTREAM WATERSHED PROGRAMS			
MAIN STEM OR MAJOR TRIBUTARY RESERVOIR			
POWER <sup>(1)</sup> - NUCLEAR			
POWER - PUMPED STORAGE			
RECREATIONAL NAVIGATION			
COMMERCIAL NAVIGATION & CHANNEL IMPROVEMENT			
LOCAL PROTECTION			
ANADROMOUS FISH PASSAGE <sup>(2)</sup>			
NATIONAL RECREATIONAL AREA - FEDERAL			
NATIONAL RECREATIONAL AREA - STATE			
NATIONAL FORESTS			

NOTES: 1. EXISTING CONVENTIONAL HYDRO. DAMS NOT SHOWN  
2. EXISTING POWER DAMS MODIFIED FOR FISH PASSAGE

PROJECTS AND PROGRAMS NOT SHOWN ON MAP

	EXISTING OR UNDER WAY	EARLY ACTION PLAN	LONG RANGE PLAN
FLOOD PLAIN ZONING	X	X	X
WATER QUALITY	X	X	X
POWER - CONVENTIONAL HYDRO.	X	X	X
WILD AND SCENIC RIVER AREA	-	X	X
NATURAL, ARCHEOLOGICAL & HISTORIC POINTS OF INTEREST	X	X	X
FISH HATCHERIES <sup>(1)</sup>	X	X	X
WILDLIFE PROGRAMS	X	X	X
NATIONAL FORESTS <sup>(2)</sup>	-	X	X
STATE FORESTS & PARKS	X	X	X
WATER SUPPLY	X	X	X
SMALL UPSTREAM IMPOUNDMENTS	X	X	X
LAND TREATMENT MEASURES	X	X	X

NOTES: 1. RESIDENT FISH HATCHERIES NOW EXIST IN BASIN  
ADDITIONAL RESIDENT FISH HATCHERIES AS WELL AS ANADROMOUS  
FISH HATCHERIES ARE RECOMMENDED IN EARLY ACTION  
AND LONG RANGE PLAN  
2. ADDITIONAL NATIONAL FORESTS LANDTAKINGS WITHIN  
THE PROCLAMATION BOUNDARY



BASIN SUB-AREAS

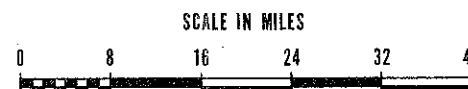
LEGEND

- I UPPER BASIN - N.H.
- II UPPER BASIN - VT.
- III MIDDLE BASIN - N.H.
- IV MIDDLE BASIN - VT.
- V LOWER BASIN - MASS.
- VI LOWER BASIN - CONN.

COMPREHENSIVE WATER AND RELATED LAND RESOURCES INVESTIGATION

CONNECTICUT RIVER BASIN

COMPREHENSIVE  
PLAN OF DEVELOPMENT



CONNECTICUT RIVER BASIN  
COORDINATING COMMITTEE